ORDER NO. AD9004091C2

# Service Manual

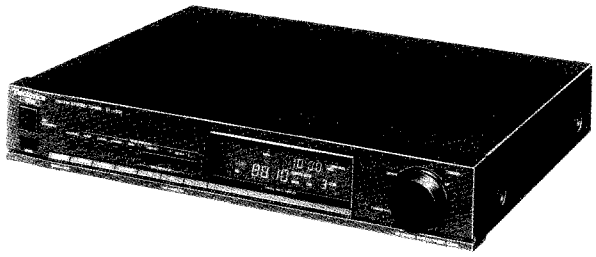
Tuner

## MW/FM STEREO TUNER

# ST-X301

**Color**

| |
|---|
| (K) ..... Black Type |



**Area**

| Country Code | Areas | Color |
|---|---|---|
| (EG) | F.R. Germany | (K) |
| (EI) | Italy | |

## SPECIFICATIONS

### (DIN 45 500)

### ■ FM TUNER SECTION

| | |
|---|---|
| **Frequency range** | 87.50~108.00 MHz (0.05 MHz steps) |
| **Sensitivity** | 1.5 µV (IHF, usable) |
| **S/N 30 dB** | 1.3 µV (75 Ω) |
| **S/N 26 dB** | 1.2 µV (75 Ω) |
| **S/N 20 dB** | 0.9 µV (75 Ω) |
| **IHF 46 dB stereo quieting sensitivity** | 28 µV/75 Ω |
| **Total harmonic distortion** | |
| **MONO** | 0.15 % |
| **STEREO** | 0.3 % |
| **S/N** | |
| **MONO** | 70 dB (78 dB, IHF) |
| **STEREO** | 65 dB (70 dB, IHF) |
| **Frequency response** | 20 Hz~15 kHz, +0.5 dB~−2.0 dB |
| **Alternate channel selectivity** | |
| **±400 kHz** | 70 dB |
| **Capture ratio** | 1.0 dB |
| **Image rejection at 98 MHz** | 90 dB |
| **IF rejection at 98 MHz** | 90 dB |
| **Spurious response rejection at 98 MHz** | 90 dB |
| **AM suppression** | 55 dB |
| **Stereo separation** | |
| **1 kHz** | 40 dB |
| **Carrier leak** | |
| **19 kHz** | −65 dB (−70 dB, IHF) |
| **38 kHz** | −55 dB (−60 dB, IHF) |
| **Channel balance (250 Hz~6,300 Hz)** | ±1.2 dB |
| **Limiting point** | 1.0 µV |
| **Bandwidth** | |
| **IF amplifier** | 180 kHz |
| **FM demodulator** | 1000 kHz |
| **Antenna terminals** | 75 Ω (unbalanced) |

### ■ AM TUNER SECTION

| | |
|---|---|
| **Frequency range** | |
| | 522 kHz~1611 kHz (9-kHz steps) |
| | 530 kHz~1620 kHz (10-kHz steps) |
| **Sensitivity (S/N 20 dB)** | 20 µV, 300 µV/m |
| **Selectivity (±9 kHz)** | |
| **(at 999 kHz)** | 50 dB |
| **Image rejection** | |
| **(at 999 kHz)** | 40 dB |
| **IF rejection** | |
| **(at 999 kHz)** | 60 dB |

### ■ TIMER SECTION

| | |
|---|---|
| **Clock** | Quartz-lock type |
| | 24-hour indication |
| **Functions** | 24-hour programmable; |
| | weekly (1 setting) |
| | once only (1 setting) |
| | sleep (at 10~60 min., 10-min. intervals) |
| **Programmable content** | |
| | Program source (FM, AM, CD, TAPE) |
| | Timer rec/timer play/power ON/OFF setting |
| | Designation of preset station |
| **Setting intervals** | 1 minute~23-hours, 59 minutes |
| | (at 1-min. intervals) |
| **Priority order** | sleep, once, weekly |

### ■ GENERAL

| | |
|---|---|
| **Output voltage** | 0.5 V (1.0 V IHF) |
| **Power consumption** | 9 W (Standby 5 W) |
| **Power supply** | AC 50 Hz/60 Hz, 220 V |
| **Dimensions (W × H × D)** | 360 × 64.5 × 288 mm |
| | (14-3/16" × 2-17/32" × 11-11/32") |
| **Weight** | 2.1 kg (4.6 lb.) |

**Note:**
Specifications are subject to change without notice. Weight and dimensions are approximate.

Technics

**Matsushita Electric Industrial Co., Ltd.**
Central P.O. Box 288, Osaka 530-91, Japan

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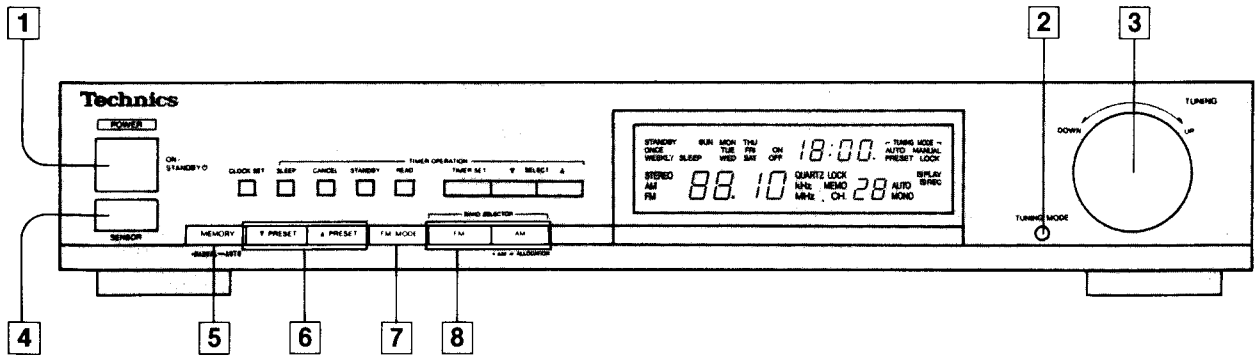
# ■ ACCESSORIES

- Stereo connection cable (SJPK2203-2) ..... 1
- FM indoor antenna (SSA270M) ..... 1
- AM loop antenna (SPB1162T) ..... 1
- AM antenna holders (SMA233-1M) ..... 1
  (SMA231M) ..... 1
- Screws (XTB3+10AFZ) ..... 2
- 3-core flat cable (SWKTX930E) ..... 1
- AC power supply cord (SFDAC05E03) ..... 1
- Remote-control transmitter (RAK-SC301X) ..... 1
- Batteries (R03) ..... 2

# ■ LOCATION OF CONTROLS




## Tuner section

**1 Power "STANDBY ⏻ /ON" switch (POWER/ON/STANDBY ⏻ )**

**2 Tuning-mode selector (TUNING MODE)**

**3 Tuning control (TUNING)**

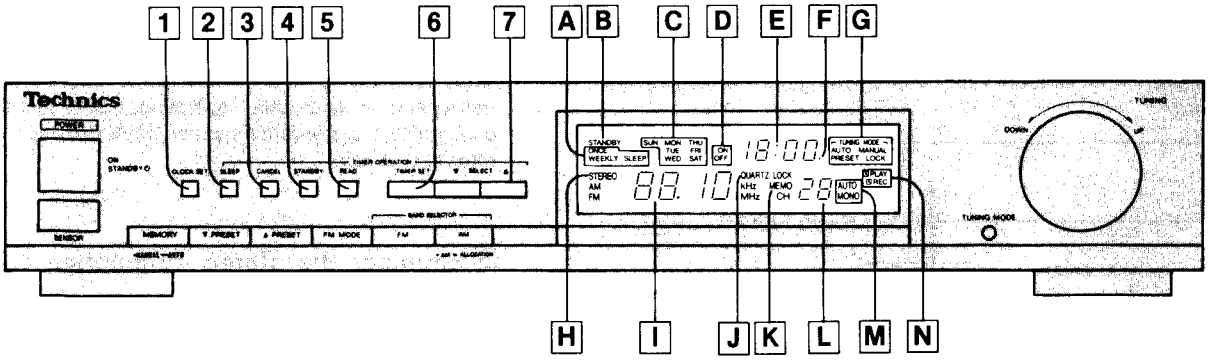
**4 Remote-control signal receptor (SENSOR)**

**5 Memory button (MEMORY)**

**6 Preset-channel buttons (▼ PRESET/▲ PRESET)**

**7 FM mode selector (FM MODE)**

**8 Band selectors (BAND SELECTOR)**




## Timer section

1 Clock set button (CLOCK SET)

2 Sleep button (SLEEP)

3 Cancel button (CANCEL)

4 Stand-by button (STANDBY)

5 Read button (READ)

6 Set button (TIMER SET)

7 Select buttons (SELECT)

## Display section

A Timer-mode indicator (ONCE/WEEKLY/SLEEP)

B Stand-by indicator (STANDBY)

C Day display

D Timer ON/OFF indicator (ON/OFF)

E Time display

F Colon indicator

G Tuning-mode indicator (AUTO/MANUAL/PRESET/LOCK)

H FM stereo indicator (STEREO)

I Digital frequency display

J Quartz-lock indicator (QUARTZ LOCK)

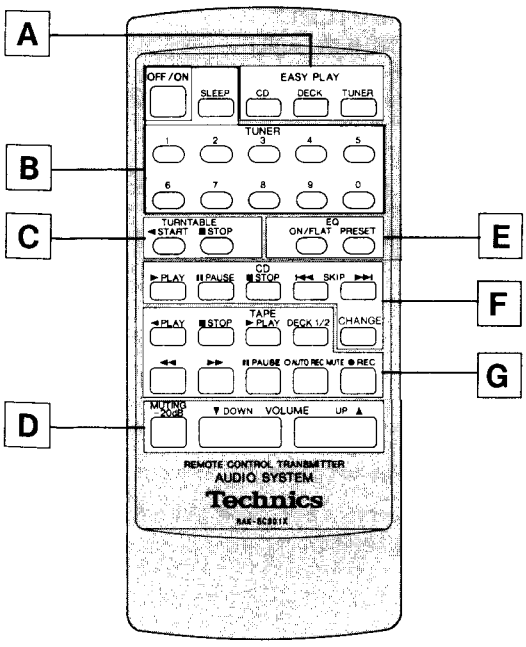
K Memory indicator (MEMO)

L Channel display

M FM mode indicator (AUTO/MONO)

N Timer play/rec indicator (L PLAY/REC)

## •REMOTE CONTROL TRANSMITTER




A Easy play keys

B Tuner keys

C Turntable keys

D Amplifier keys

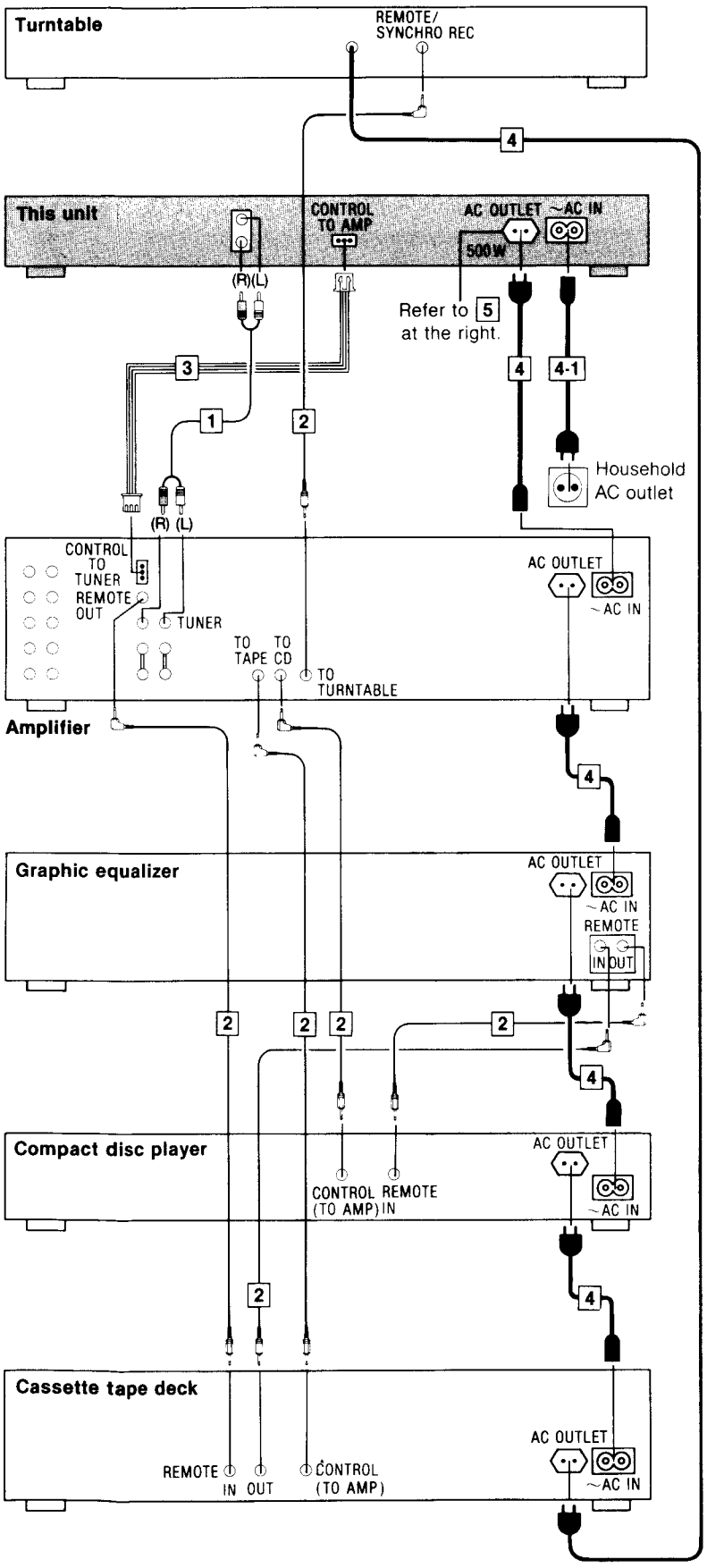
E Graphic equalizer controls

F Compact disc player keys

G Cassette tape deck keys

# ■ CONNECTIONS

Make connections in the numbered sequence by using the included cables and power cord.




Make connections as described below for remote-control operation and timer operation. For information concerning the stereo connection cables of each unit, refer to that unit.

### 1 Connect the stereo connection cable

(included).

### 2 Connect the L-type cables.

### 3 Connect the 3-core flat cables.

**3-1 Connect the 3-core flat cable** (included).

**3-2 Connect the 3-core flat cable** (included with the cassette deck).

### 4 Connect the AC power supply cords.

**4-1 Connect the AC power supply cord** (included).

Connect this cord only after all other cables have been connected.

**Notes:**

- Configuration of the AC outlets and AC power supply cords differ according to area.
- If the graphic equalizer is not used in combination with these components, connect the AC power supply cord of the compact disc player to the AC outlet of the amplifier.

### 5 "AC OUTLET"

**"SWITCHED" outlet**

Power is controlled by the power switch.
This outlet is only for use with other audio equipment.

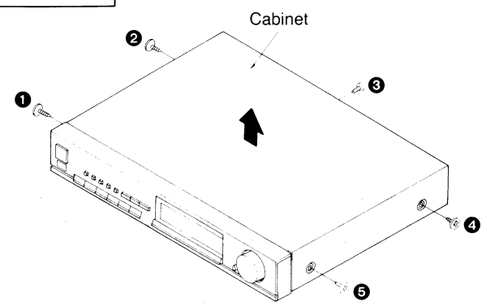
**Note:**

If another unit is connected to the AC outlet of this unit, be sure to check that the total amount of power consumption of each unit to be connected does not exceed the maximum power output allowed for the AC outlet of this unit.

# ■ DISASSEMBLY INSTRUCTIONS

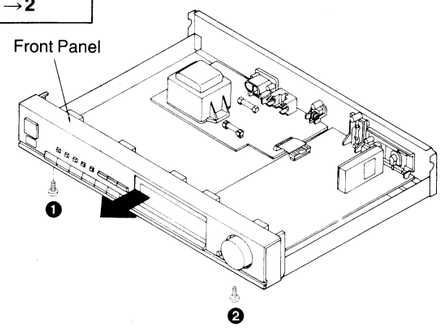
**"ATTENTION SERVICER"**
Some chassis components may have sharp edges. Be careful when disassembling and servicing.

| Ref. No. 1 | Removal of the cabinet |
|---|---|
| Procedure 1 | |



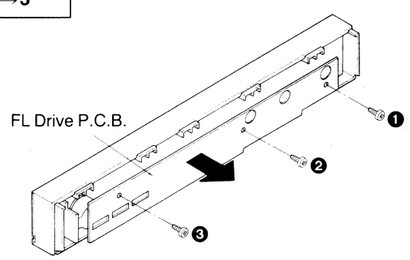

●Remove the 5 screws (❶~❺).

| Ref. No. 2 | Removal of the front panel |
|---|---|
| Procedure 1→2 | |



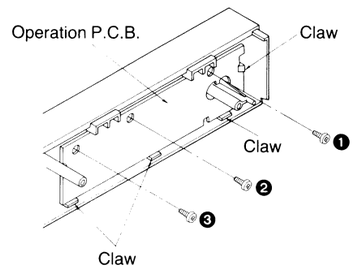

1. Remove the 2 screws (❶, ❷).
2. Remove the front panel in the direction of the arrow.

| Ref. No. 3 | Removal of the FL drive P.C.B. |
|---|---|
| Procedure 1→2→3 | |



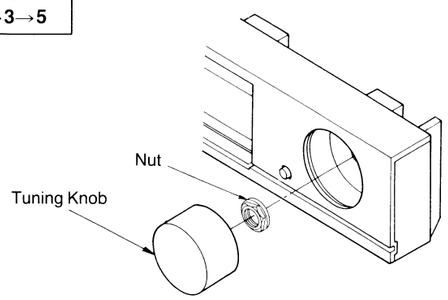

1. Remove the 3 screws (❶~❸).

| Ref. No. 4 | Removal of the operation P.C.B. |
|---|---|
| Procedure 1→2→3→4 | |

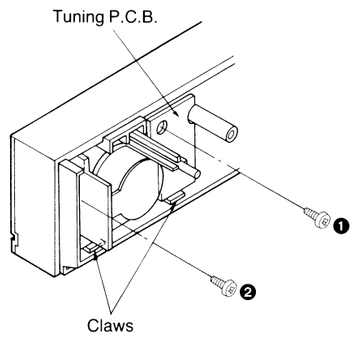



1. Remove the 3 screws (❶~❸).
2. Release the 4 claws.

| Ref. No. 5 | Removal of the tuning P.C.B. |
|---|---|
| Procedure 1→2→3→5 | |



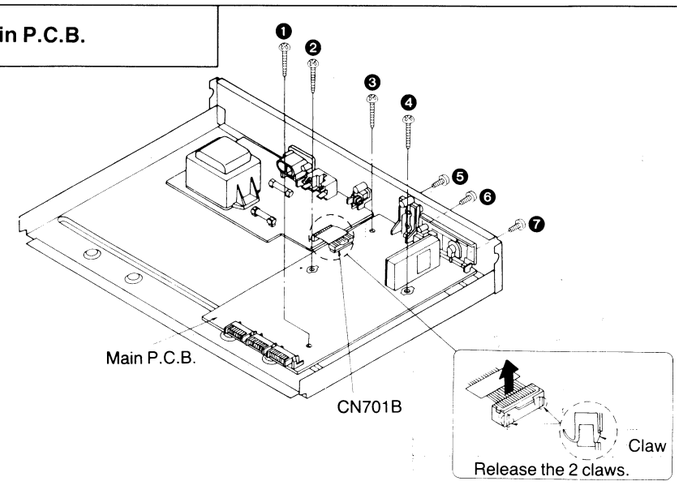

1. Pull out the tuning knob.
2. Remove the nut.




3. Remove the 2 screws (❶, ❷).
4. Release the 4 claws.

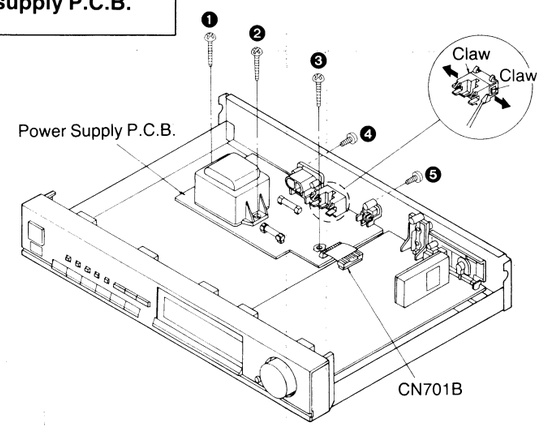
| Ref. No. 6 | Removal of the main P.C.B. |
|---|---|
| Procedure 1→2→6 | |

1. Remove the 7 screws (❶~❼).
2. Remove the connection (CN701B).



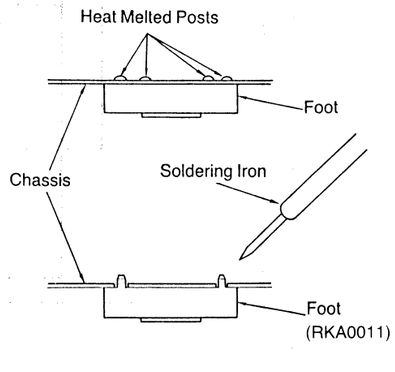

| Ref. No. 7 | Removal of the power supply P.C.B. |
|---|---|
| Procedure 1→7 | |

1. Remove the 5 screws (❶~❺).
2. Remove the connector (CN701B).
3. Remove the 2 claws of AC outlet.




## ●Replacement of the Foot.

1. Remove the 4 heat melted posts on the chassis with a pair of nippers or similar tool.
2. To replace the foot (RKA0011) on the chassis, melt the 4 posts with a soldering iron.



# ■ MEASUREMENTS AND ADJUSTMENTS

## FM ADJUSTMENT

**Control positions and equipment used**

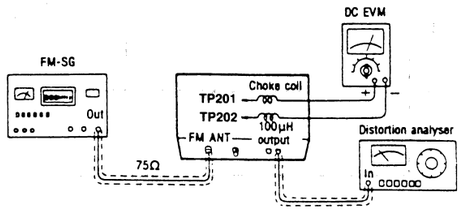
- FM signal generator(FM-SG)
- Stereo modulator
- Distortion analyser
- DC electronic voltmeter(EVM)
- Frequency counter
- Choke coil(100μH)
- Resistor(100kΩ)

**Note:** For Z251 (AM-ANT/OSC) and Z202 (AM-IFT), they are supplied as adjusted parts. So, do not turn the cores of the parts. It is not necessary to adjust the AM circuit.

### FM MONO DISTORTION ADJUSTMENT

1.Test equipment connection is shown in figure.
2.Set the unit to "**FM**" mode.
3.Set the radio frequency display and signal generator to **100.10MHz**.
4.Adjust the core of **T201** so that the voltage measured in signal mode is **0mV(0±20mV)** in 300mV range.
5.Adjust **T202** so that the distortion factor of L-CH and R-CH is minimized.
6.Repeat steps 4 and 5.
**Note:** The adjusting screwdriver used should be made of resin.

FM SIGNAL GENERATOR CONDITION
Modulation .....100%
Modulation frequency .....1kHz
Output level.....66dB

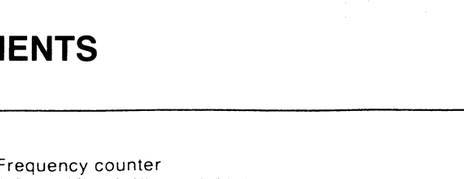


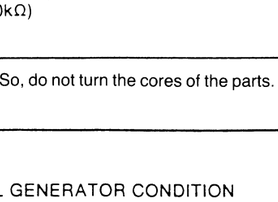

### MPX VCO ADJUSTMENT

1.Test equipment connection is shown in figure.
2.Set the unit to "**on/auto**" position.
3.Set the radio frequency display and signal genarator to **100.10MHz**.
4.Adjust **VR301** for **19kHz±30Hz** on frequency counter reading.

**USING ALTERNATE SYSTEM**
1.Receive the stereo broadcast.
2.Adjust **VR301** until stereo indicator lights up. Fix the arm of **VR301** as shown in figure.

FM SIGNAL GENERATOR CONDITION
Modulation .....100%
Modulation frequency .....0kHz
Output level.....66dB

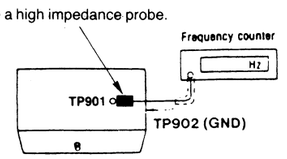



Ⓐ−Ⓑ,
Ⓓ−Ⓔ..... "Stereo" OFF position
Ⓑ−Ⓓ..... "Stereo" ON position (Indicator lighting)
Ⓒ..... Adjust point of pilot circuit

### PLL CLOCK FREQUENCY ADJUSTMENT

1.Test equipment connection is shown in figure.
2.Set the Power Switch to "OFF". (The indication "E" in the display will blink.)
3.Adjust **CT901** for **2,097,152 Hz±10 Hz** on frequency counter reading.



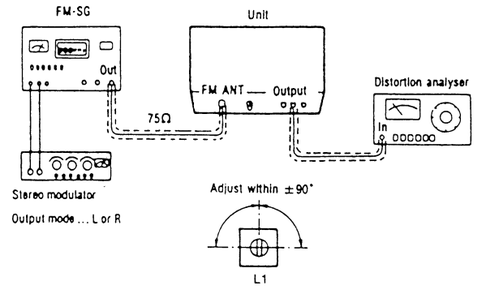



### FM STEREO DISTORTION ADJUSTMENT

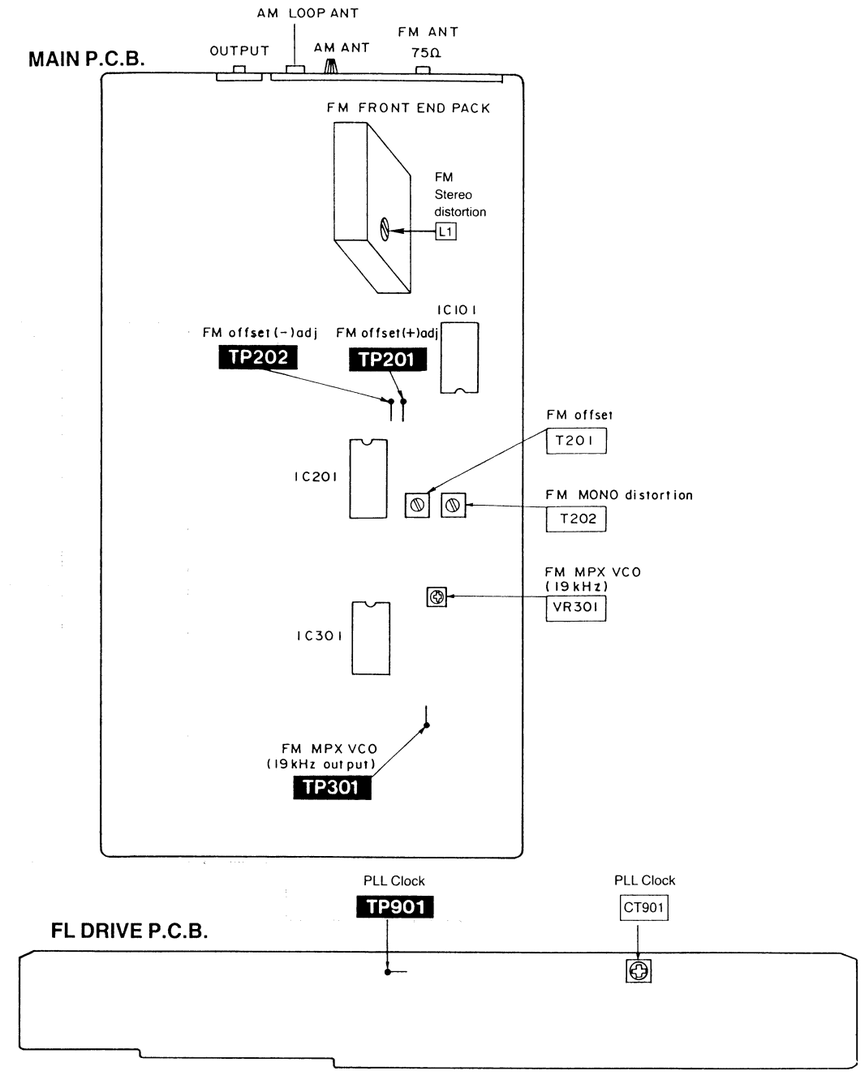
1. Test equipment connection is shown in figure.
2. Set the unit to "**FM**" mode.
3. Set the radio frequency display and signal generator to **100.10MHz**.
4. Adjust **L1** so that the distortion factor of L-CH is minimized.
5. Make sure that the distortion factors of L-CH and R-CH are nearly the same with each other to minimum.

**Notes:**
1. The adjusting screwdriver used should be made of resin.
2. **L1** should be rotated no more 1/4 turn (90 deg.) on either side.

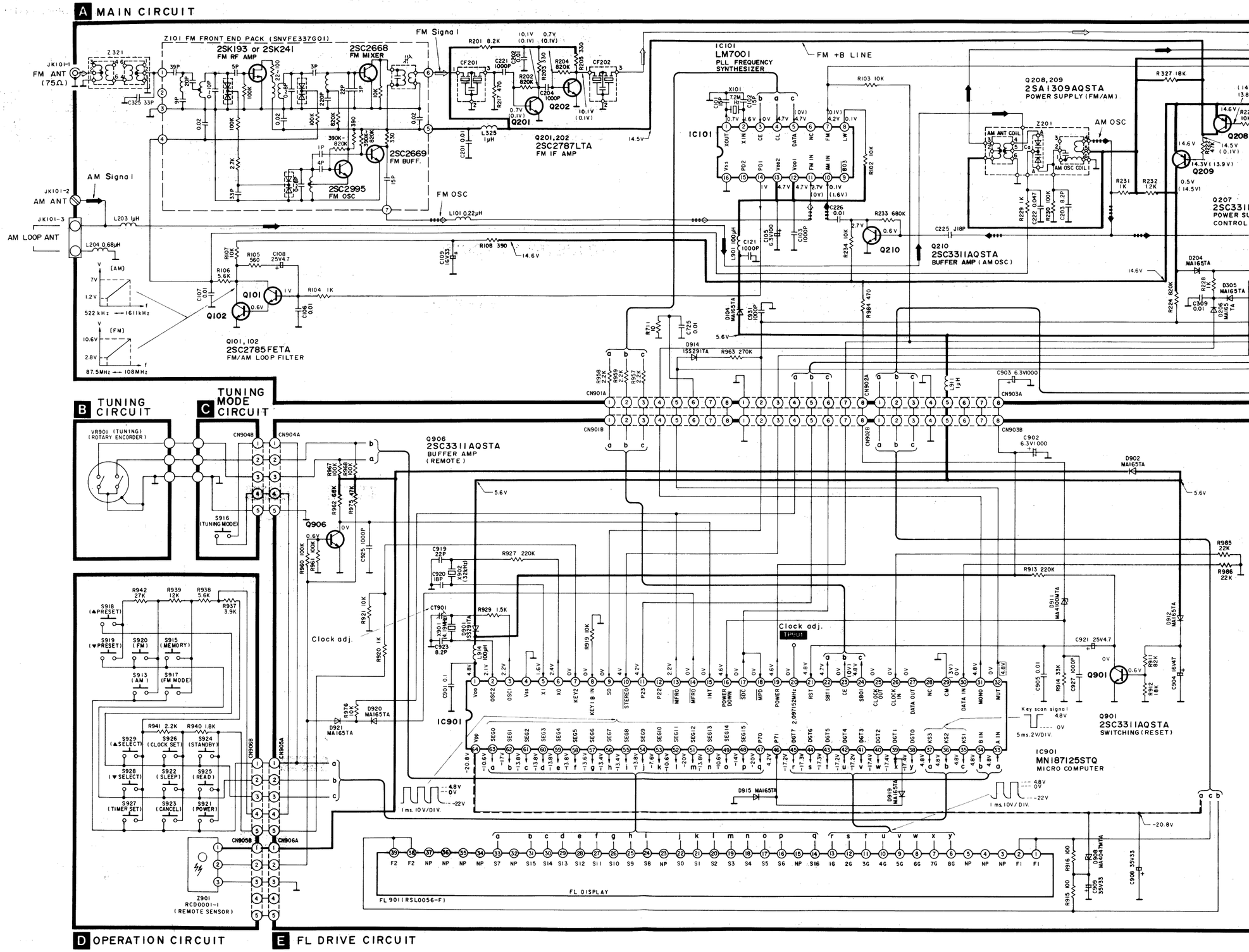
FM SIGNAL GENERATOR CONDITION
Modulation.....Stereo "L" mode or "R" mode 45%, Pilot 10%
Modulation frequency.....1kHz (Pilot 19kHz)
Output level.....66dB

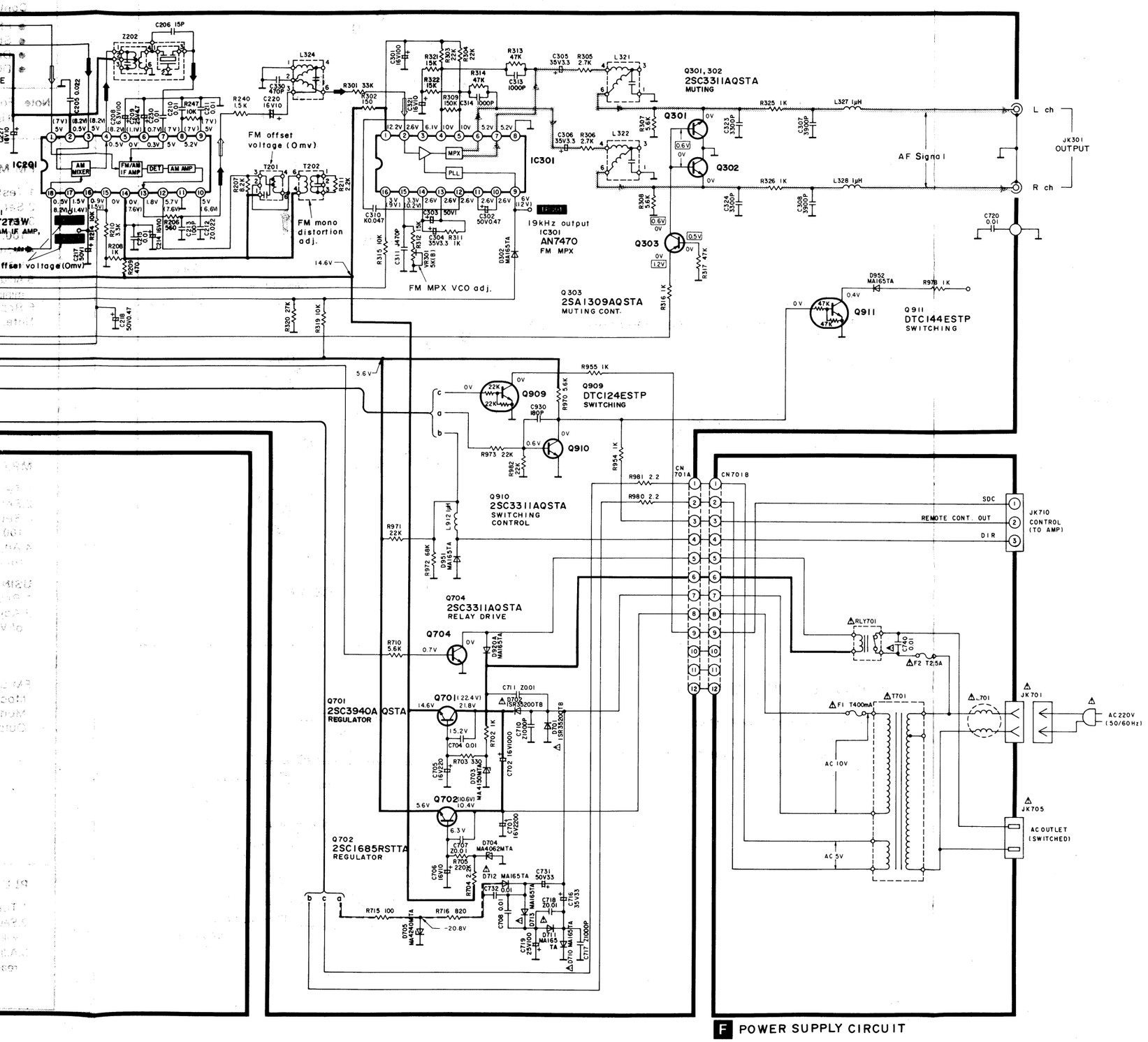



## ●ADJUSTMENT POINT



# ■ SCHEMATIC DIAGRAM (Parts list on pages 19～22.)






F POWER SUPPLY CIRCUIT

(This schematic diagram may be modified at any time with the development of new technology.)

**Notes:**

- ●**S913:** Band select (MW) switch.
- ●**S915:** Memory switch.
- ●**S916:** Tuning mode select switch.
- ●**S917:** FM mode select switch.
- ●**S918:** Preset-channel (▲) switch.
- ●**S919:** Preset-channel (▼) switch.
- ●**S920:** Band select (FM) switch.
- ●**S921:** Power switch.
- ●**S922:** Sleep switch.
- ●**S923:** Cancel switch.
- ●**S924:** Stand-by switch.
- ●**S925:** Read switch.
- ●**S926:** Clock set switch.
- ●**S927:** Timer set switch.
- ●**S928:** Select (▼) switch.
- ●**S929:** Select (▲) switch.

●Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.

●( ): MW voltage
[ ]: muting voltage

●——— Positive voltage lines (+) - - - - - Negative voltage lines (−)

**AF signal lines**

**FM OSC** **FM signal**

**AM OSC** **AM signal**

●Important safety notice
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

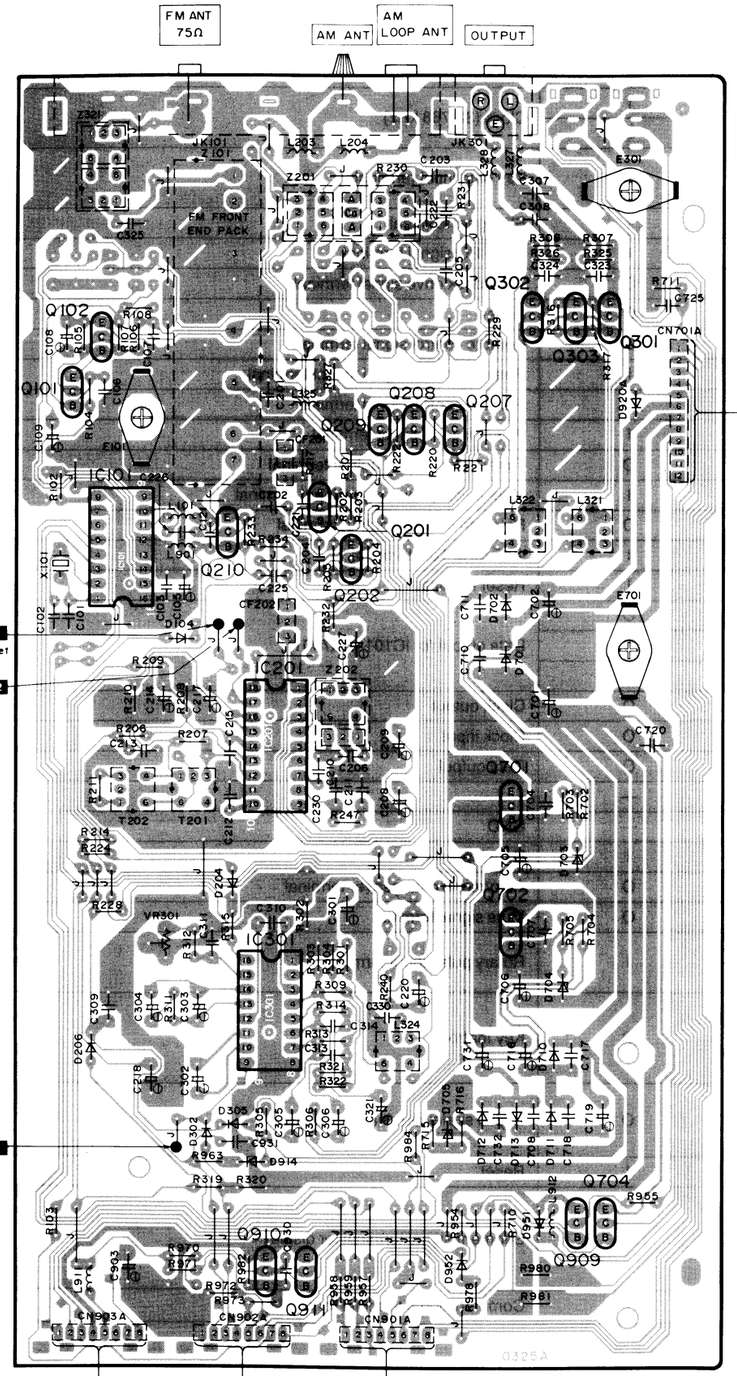
**·Caution!**

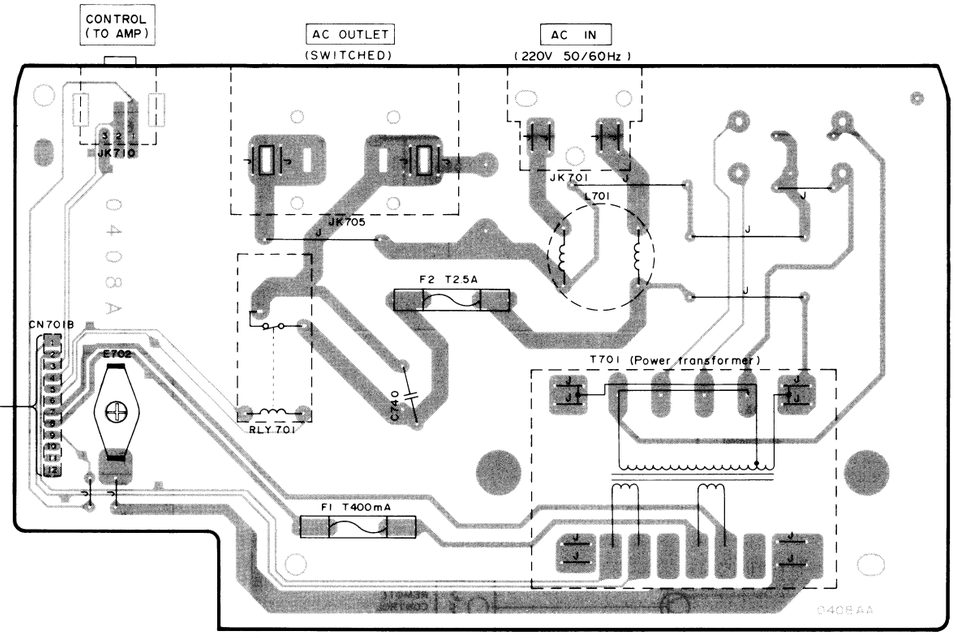
IC and LSI are sensitive to static electricity.
Secondary trouble can be prevented by taking care during repair.

- ·Cover the parts boxes made of plastics with aluminum coil.
- ·Ground the soldering iron.
- ·Put a conductive mat on the work table.
- ·Do not touch the legs of IC or LSI with the fingers directly.

# ■ CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM (Parts list on pages 19~22.)

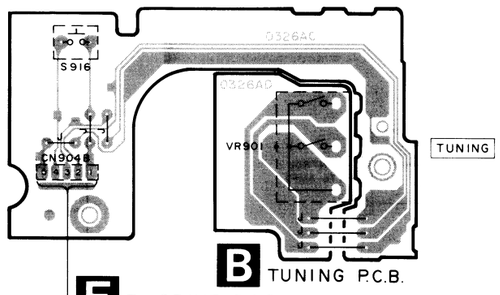
**A** MAIN P.C.B.



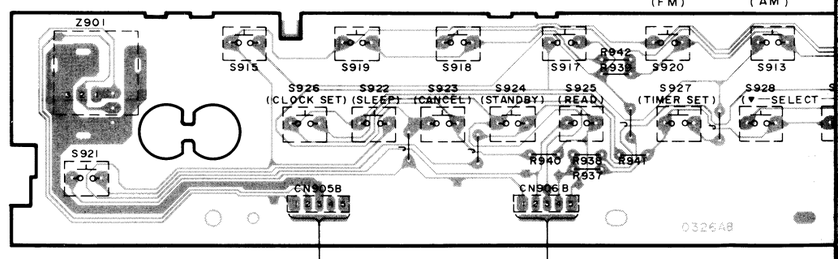

**F** POWER SUPPLY P.C.B.

**C** TUNING MODE P.C.B.

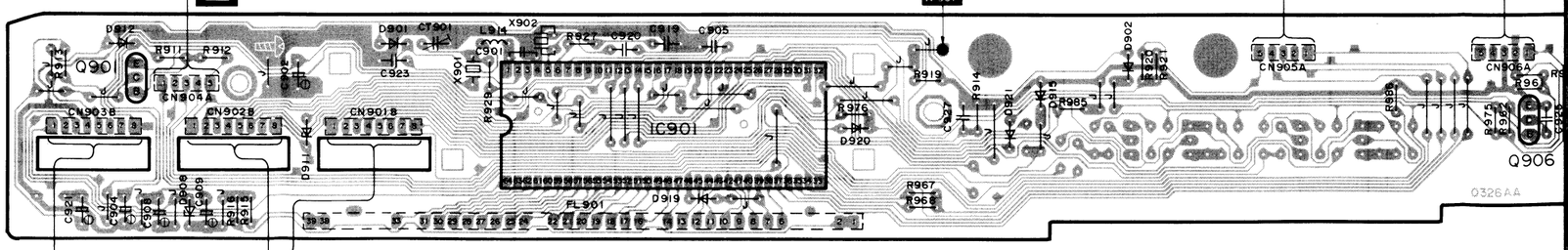



**B** TUNING P.C.B.

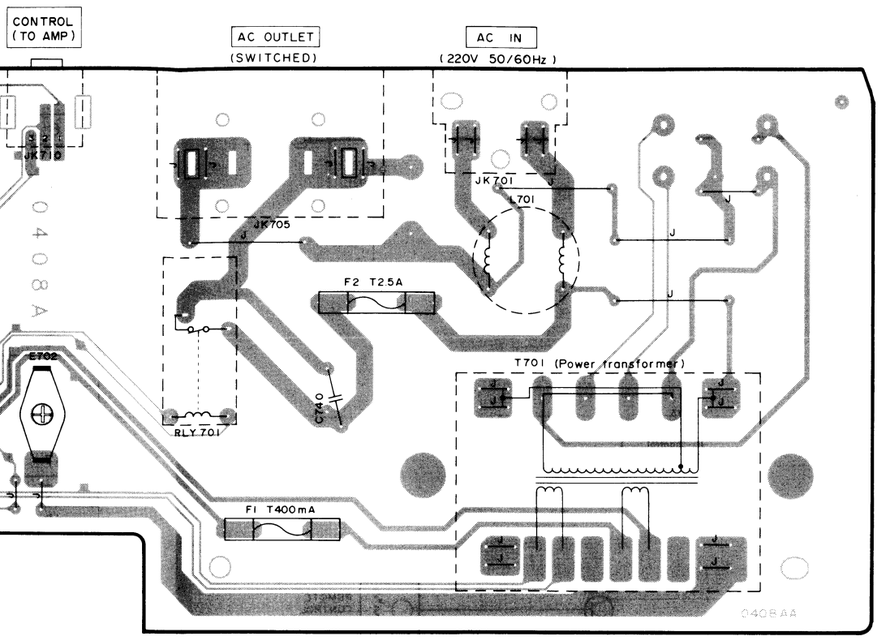
**D** OPERATION P.C.B.




**E** FL DRIVE P.C.B.

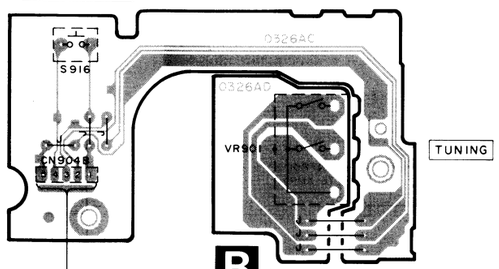


(Parts list on pages 19~22.)




**F** POWER SUPPLY P.C.B.

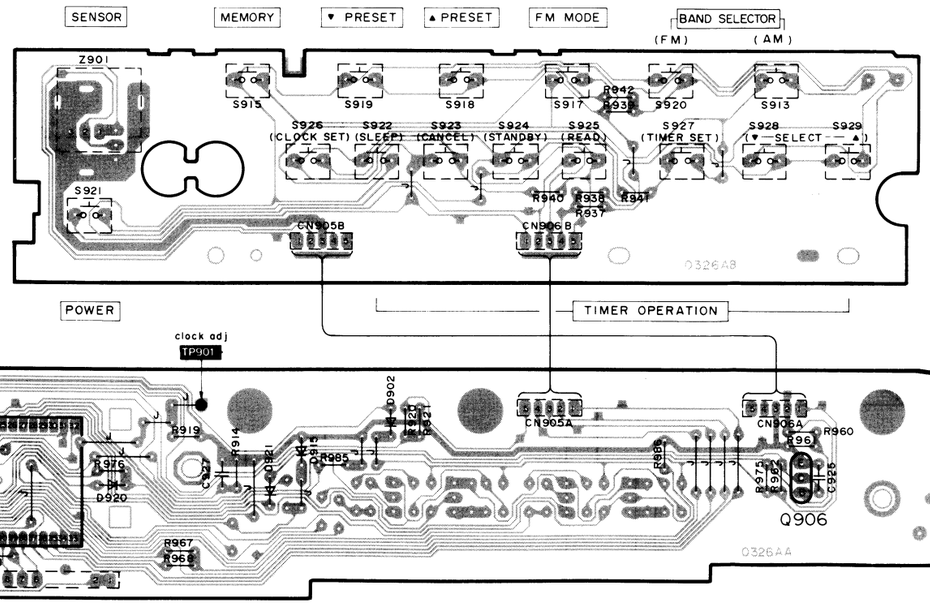
**C** TUNING MODE P.C.B.



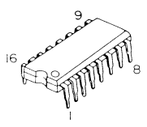
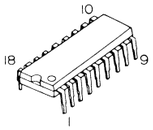
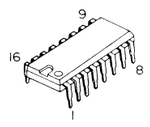
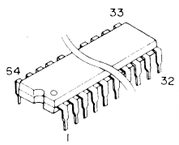
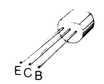
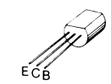
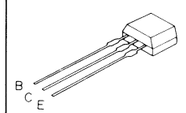
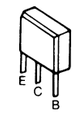
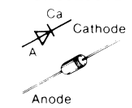
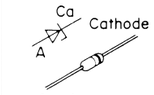
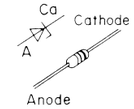

**B** TUNING P.C.B.

**E** FL DRIVE P.C.B.

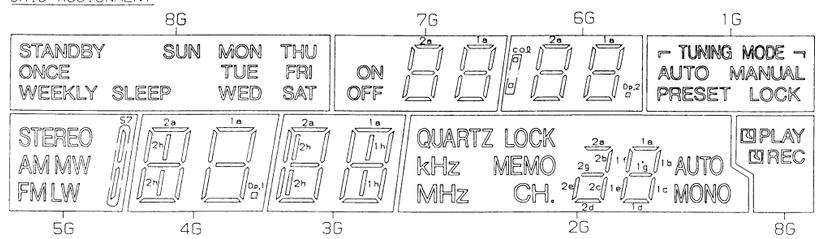
**D** OPERATION P.C.B.




## ■ TERMINAL GUIDE OF IC'S, TRANSISTORS AND DIODES

| LM7001 | AN7273W | AN7470 | MN181125STQ | 2SC1685RSTTA | 2SC3940AQSTA |
|---|---|---|---|---|---|
|  |  |  |  |  |  |
| DTC124ESTP<br>DTC144ESTP | | 2SA1309AQSTA<br>2SC2785FETA<br>2SC2787LTA<br>2SC3311AQSTA | MA165TA<br>1SS291TA<br>1SR35200TB | MA4100MTA<br>MA4150MTA<br>MA4240MTA | MA4062MTA<br>MA4047MTA |
|  |  | |  |  |  |

## ■ DESCRIPTION OF FL PANEL



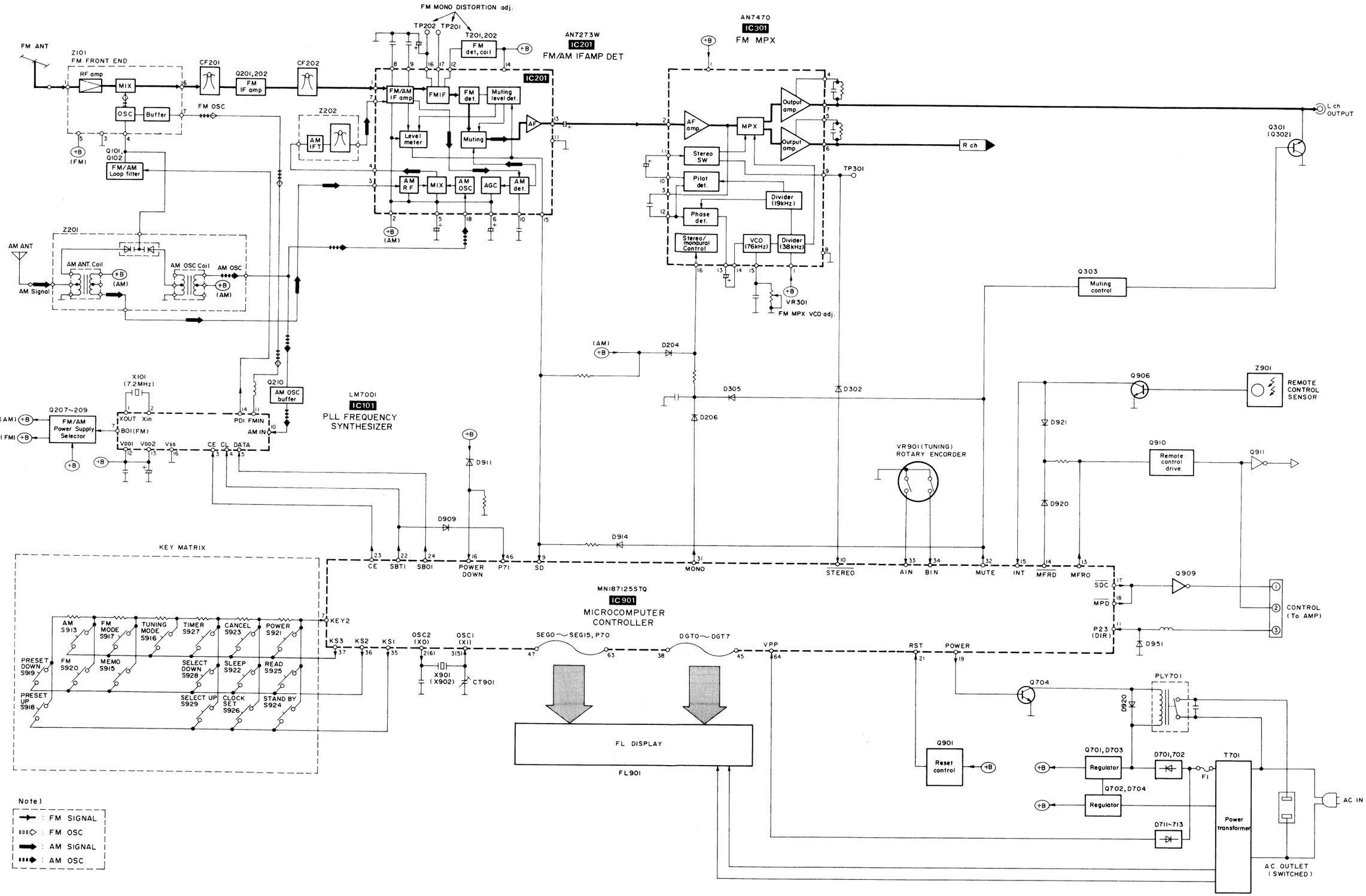

ANODE CONNECTION

| | 8G | 7G | 6G | 5G | 4G | 3G | 2G | 1G |
|---|---|---|---|---|---|---|---|---|
| S0 | SLEEP | 2d | 2d | LW | 2d | 2d | CH. | LOCK |
| S1 | - | 2e | 2e | FM | 2e | 2e | MHz | - |
| S2 | WEEKLY | 2c | 2c | AM | 2c | 2c | kHz | MANUAL |
| S3 | - | 2g | 2g | MW | 2g | 2g | 2a,2d,2e,2g | - |
| S4 | ONCE | 2f | 2f | - | 2f | 2f | MEMO | - |
| S5 | - | 2b | 2b | - | 2b | 2b | AUTO | AUTO |
| S6 | STANDBY | 2a | 2a | STEREO | 2a | 2a | QUARTZ LOCK | PRESET |
| S7 | └ PLAY | ON | colon | / | 2h | 2h | 2b | ┌ TUNING MODE ┐ |
| S8 | WED | 1d | 1d | - | 1d | 1d | 1d | - |
| S9 | SAT | 1e | 1e | - | 1e | 1e | 1e | - |
| S10 | TUE | 1c | 1c | - | 1c | 1c | 1c | - |
| S11 | FRI | 1g | 1g | - | 1g | 1g | 1g | - |
| S12 | MON | 1f | 1f | - | 1f | 1f | 1f | - |
| S13 | THU | 1b | 1b | - | 1b | 1b | 1b | - |
| S14 | SUN | 1a | 1a | - | 1a | 1a | 1a | - |
| S15 | └ REC | OFF | DP,2 | - | DP,1 | 1h | 2c | - |
| S16 | - | - | - | - | - | - | MONO | - |

ST-X301



# ■ BLOCK DIAGRAM




| Pin No. |
|---|
| 1 |
| 2 |
| 3 |
| 4 |
| 5 |
| 6 |
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| 10 |
| 11 |
| 12 |
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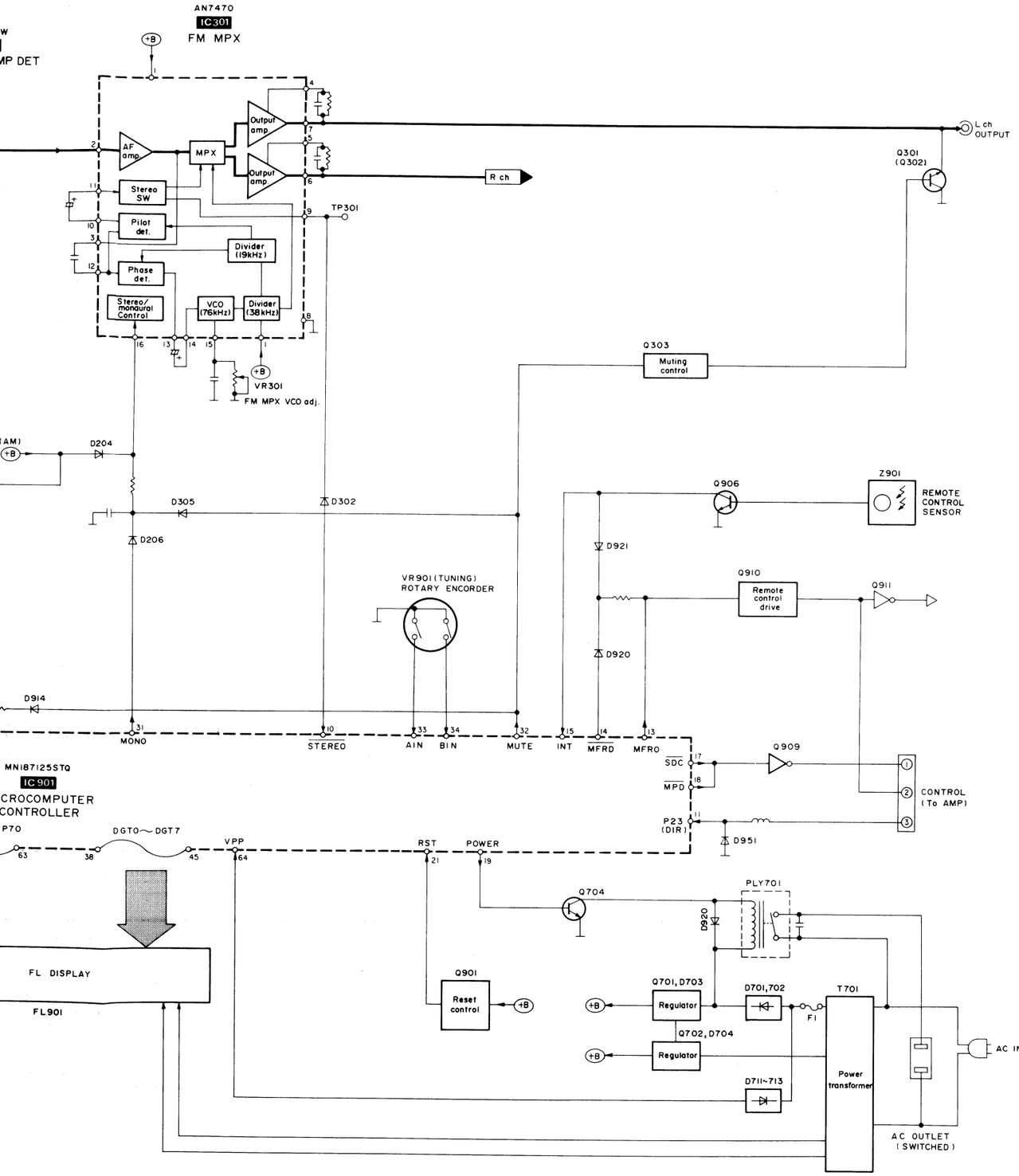
| 47 |
| 63 |
| 64 |






## ■ FUNCTIONS OF IC TERMINALS (IC901: MN187125STQ)

| Pin No. | Mark | I/O Division | Function |
|---|---|---|---|
| 1 | VDD | I | Power supply (connected to +5 V) |
| 2 | OSC2 | O | Clock (4.19 MHz) |
| 3 | OSC1 | I | |
| 4 | VSS | — | GND |
| 5 | XI | I | Clock (32.768 kHz) |
| 6 | XO | O | |
| 7 | KEY2 | I | Key data input terminal |
| 8 | KEY1 | | |
| 9 | SD | I | SD signal terminal |
| 10 | $\overline{\text{STEREO}}$ | I | $\overline{\text{STEREO}}$ signal terminal |
| 11 | DIR | O | Tape deck drive signal terminal |
| 12 | P22 | O | Reset |
| 13 | $\overline{\text{MFRO}}$ | O | Remote control signal terminal |
| 14 | MFRD | I | Remote control signal detect terminal |
| 15 | $\overline{\text{REMOTE}}$ | I | Remote control signal terminal |
| 16 | $\overline{\text{Power Down}}$ | I | Power failure detect terminal |
| 17 | SDC | O | Tuner select signal output terminal |
| 18 | MPD | I | Mechanical power signal input terminal |
| 19 | POWER | O | Relay drive signal output terminal |
| 20 | TCIO | I | 4.19 MHz Test terminal |
| 21 | RST | I | Reset terminal |
| 22 | SBTI | O | Data output for IC101 (LM7001) |
| 23 | CE | O | |
| 24 | SBOI | O | |
| 25 | BUS CK1 | O | Clock output |
| 26 | BUS CK2 | O | Clock input |
| 27 | BUS DATA | O | Data output |
| 28 | NC | — | ——— |
| 29 | CM | — | GND |
| 30 | BUS DATA2 | I | Data input |
| 31 | MONO | O | Auto/mono changeover terminal |
| 32 | MUTE | O | Mute signal terminal |
| 33 | A IN | I | Rotary pulse input terminal |
| 34 | B IN | | |
| 35 | KS1 | O | Key matrix |
| 36 | KS2 | | |
| 37 | KS3 | | |
| 38 | DGT0 | O | Digital signal terminal for display |
| 45 | DGT7 | | |
| 46 | P71 | I | Reset |
| 47 | P70 | O | Segment signal terminal for display |
| 63 | SEG15 ~ SEG0 | | |
| 64 | VPP | — | Common signal terminal for display |

# ■ REPLACEMENT PARTS LIST

Notes: •Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
•The parenthesized indications in the Remarks columns specify the areas. (Refer to the cover page for area.)
Parts without these indications can be used for all areas.
•[F]: Indicates parts that are supplied by PFS. (Panasonic France S.A. Longwy division).

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| | | | |
| | | INTEGRATED CIRCUIT(S) | |
| | | | |
| IC101 | LM7001 | IC, PLL FREQUENCY SYNTHE | |
| IC201 | AN7273W | IC, FM/AM IF AMP. /DET | |
| IC301 | AN7470 | IC, FM MPX | |
| IC901 | MN187125STQ | IC, MICRO COMPUTER | |
| | | | |
| | | TRANSISTOR(S) | |
| | | | |
| Q101, 102 | 2SC2785FETA | TRANSISTOR | |
| Q201, 202 | 2SC2787LTA | TRANSISTOR | |
| Q207 | 2SC3311AQSTA | TRANSISTOR | |
| Q208, 209 | 2SA1309AQSTA | TRANSISTOR | |
| Q210 | 2SC3311AQSTA | TRANSISTOR | |
| Q301, 302 | 2SC3311AQSTA | TRANSISTOR | |
| Q303 | 2SA1309AQSTA | TRANSISTOR | |
| Q701 | 2SC3940AQSTA | TRANSISTOR | |
| Q702 | 2SC1685RSTTA | TRANSISTOR | |
| Q704 | 2SC3311AQSTA | TRANSISTOR | |
| Q901 | 2SC3311AQSTA | TRANSISTOR | |
| Q906 | 2SC3311AQSTA | TRANSISTOR | |
| Q909 | DTC124ESTP | TRANSISTOR | |
| Q910 | 2SC3311AQSTA | TRANSISTOR | |
| Q911 | DTC144ESTP | TRANSISTOR | |
| | | | |
| | | DIODE(S) | |
| | | | |
| D104 | MA165TA | DIODE | |
| D204 | MA165TA | DIODE | |
| D206 | MA165TA | DIODE | |
| D302 | MA165TA | DIODE | |
| D305 | MA165TA | DIODE | |
| D701, 702 | 1SR35200TB | DIODE | ⚠ |
| D703 | MA4150MTA | DIODE | |
| D704 | MA4062MTA | DIODE | |
| D705 | MA4240MTA | DIODE | |
| D710-713 | MA165TA | DIODE | ⚠ |
| D901 | 1SS291TA | DIODE | |
| D902 | MA165TA | DIODE | |
| D908 | MA4047MTA | DIODE | |
| D911 | MA4100MTA | DIODE | |
| D912 | MA165TA | DIODE | |
| D914 | 1SS291TA | DIODE | |
| D915 | MA165TA | DIODE | |
| D919, 920 | MA165TA | DIODE | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| D920A | MA165TA | DIODE | |
| D921 | MA165TA | DIODE | |
| D951, 952 | MA165TA | DIODE | |
| | | | |
| | | VARIABLE RESISTOR(S) | |
| | | | |
| VR301 | EVNDXAA00B53 | V. R, FM MPX VCO ADJ. | |
| VR901 | EVQWX902612B | V. R, ROTARY ENCORDER | |
| | | | |
| | | COMPONENT COMBINATION(S) | |
| | | | |
| Z101 | SNVFE337G01 | COMPONENT COMBINATION | |
| Z201 | RLA2Z001M-T | COMPONENT COMBINATION | |
| Z202 | RLI2Z003M-T | COMPONENT COMBINATION | |
| Z321 | SLA4Z13M-Z | COMPONENT COMBINATION | |
| Z901 | RCD0001-1 | COMPONENT COMBINATION | |
| | | | |
| | | COIL(S) | |
| | | | |
| L101 | RLQZPR22KT-Y | COIL | |
| L203 | ELEPK1R0MA | COIL | |
| L204 | ELEPKR68MA | COIL | |
| L321, 322 | RLM2B003M-K | COIL | |
| L324 | SLM1B10M-M | COIL | |
| L325 | RLQZP1R0KT-Y | COIL | |
| L327, 328 | RLQZP1R0KT-Y | COIL | |
| L701 | RLQZ600M-W | COIL | ⚠ |
| L901 | RLQZP101KT-Y | COIL | |
| L911, 912 | RLQZP1R0KT-Y | COIL | |
| L914 | ELEXT101KA9 | COIL | |
| | | | |
| | | TRANSFORMER(S) | |
| | | | |
| T201 | RLI4B002M-Z | TRANSFORMER | |
| T202 | RLI4B003M-Z | TRANSFORMER | |
| T701 | RTP1K4E011 | POWER TRANSFORMER | ⚠ |
| | | | |
| | | FILTER(S) | |
| | | | |
| CF201 | RLFFETNGA01L | CERAMIC FILTER | |
| CF202 | RLFFETNGA02L | CERAMIC FILTER | |
| | | | |
| | | OSCILLATOR(S) | |
| | | | |
| X101 | SVQ49U722T-S | OSCILLATOR | |
| X901 | SVQ49U422T-S | OSCILLATOR | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| X902 | RSXB32K7S01 | OSCILLATOR | |
| | | | |
| | | DISPLAY TUBE | |
| | | | |
| FL901 | RSL0056-F | DISPLAY TUBE | |
| | | | |
| | | SWITCH(ES) | |
| | | | |
| S913 | EVQ21405R | SW, | |
| S915-929 | EVQ21405R | SW, | |
| | | | |
| | | CONNECTOR(S) | |
| | | | |
| CN901A | RJU003K008M1 | SOCKET(8P) | |
| CN902A | RJU003K008M1 | SOCKET(8P) | |
| CN903A | RJU003K008M1 | SOCKET(8P) | |
| CN904A | SJT30548BB1 | CONNECTOR(5P) | |
| CN905A | SJT30548BB1 | CONNECTOR(5P) | |
| CN906A | SJT30548BB1 | CONNECTOR(5P) | |
| CN701A | RJU005W012 | SOCKET(12P) | |
| CN701B | RJT005W012 | CONNECTOR(12P) | |
| CN901B | RJT003K008M1 | CONNECTOR(8P) | |
| CN902B | RJT003K008M1 | CONNECTOR(8P) | |
| CN903B | RJT003K008M1 | CONNECTOR(8P) | |
| CN904B | SJS50581BB | SOCKET(5P) | |
| CN905B | SJS50581BB | SOCKET(5P) | |
| CN906B | SJS50581BB | SOCKET(5P) | |
| | | | |
| | | VARIABLE CAPACITOR | |
| | | | |
| CT901 | ECRLB010A12 | VARIABLE CAPACITOR | |
| | | | |
| | | FUSE HOLDER(S) | |
| | | | |
| FC701-704 | SJT390 | FUSE HOLDER | ⚠ |
| | | | |
| | | RELAIES | |
| | | | |
| RLY701 | RSY0003 | RELAY | ⚠ |
| | | | |
| | | JACK(S) | |
| | | | |
| JK101 | RJH4202 | ANTENNA TERMINAL | |
| JK301 | SJF3068N | LINE OUT TERMINAL | |
| JK701 | SJS9236 | AC INLET | ⚠ |
| JK705 | RJS1A4902-B | AC OUTLET | ⚠ |
| JK710 | RJS1A0203-0 | CONTROL(TO AMP) | |
| | | | |
| | | FUSE(S) | |
| | | | |
| F1 | XBA2C04TB0 | FUSE 250V 0.4A | ⚠ |
| F2 | XBA2C25TB0 | FUSE 250V 2.5A | ⚠ |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| | | | |
| | | | |
| | | | |

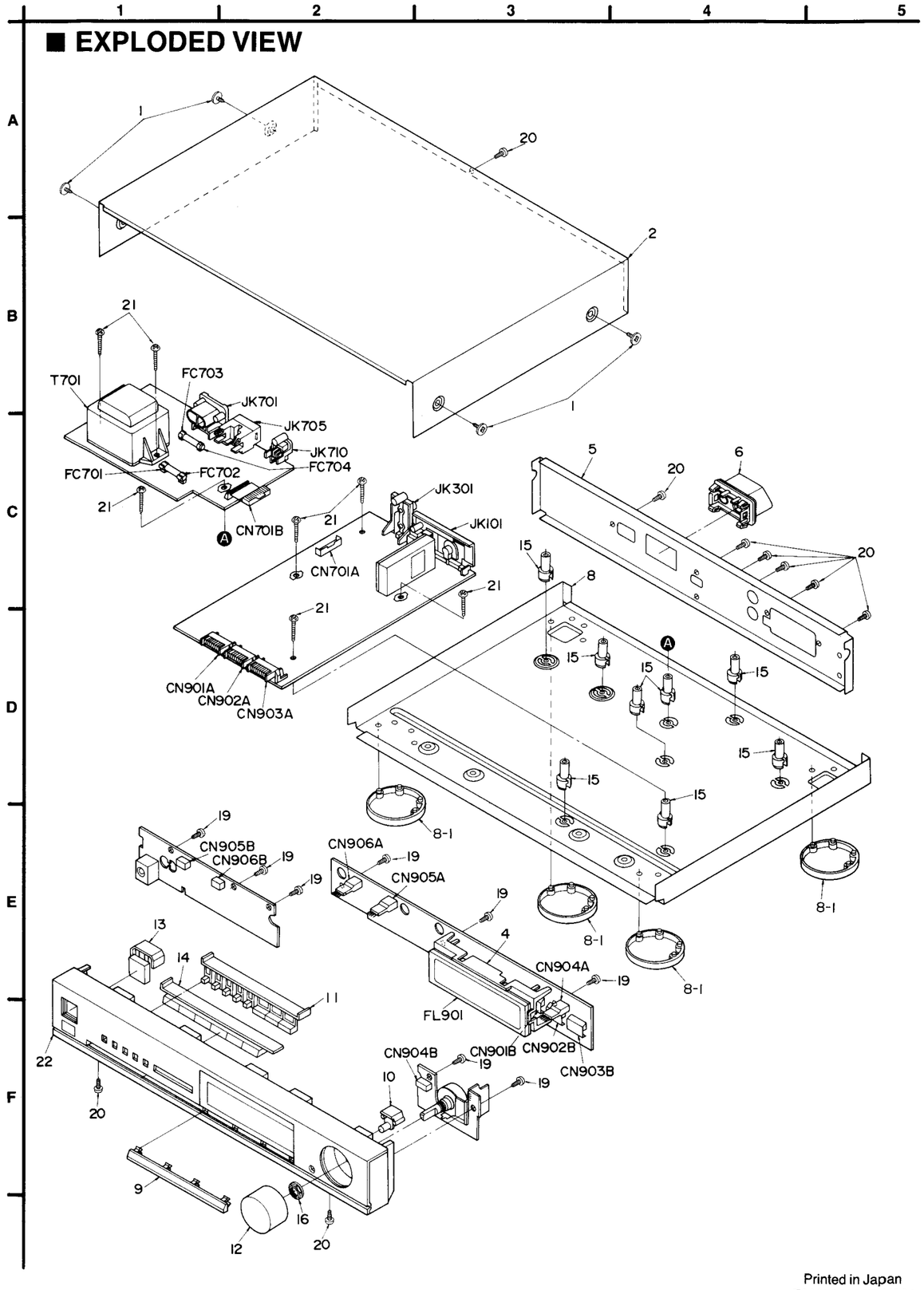
Notes : * Capacity valuse are in microfarads (uF) unless specified otherwise, P=Pico-farads(pF) F=Farads(F)
* Resistance values are in ohms, unless specified otherwise, 1K=1,000(OHM) , 1M=1,000k(OHM)

| Ref. No. | Part No. | Values & Remarks |
|---|---|---|
| | | |
| | | RESISTORS |
| | | |
| R102, 103 | ERDS2TJ103T | 1/4W 10K |
| R104 | ERDS2TJ102T | 1/4W 1K |
| R105 | ERDS2TJ561T | 1/4W 560 |
| R106 | ERDS2TJ562T | 1/4W 5.6K |
| R107 | ERDS2TJ103T | 1/4W 10K |
| R108 | ERDS2TJ391T | 1/4W 390 |
| R201 | ERDS2TJ822T | 1/4W 8.2K |
| R202 | ERDS2TJ824T | 1/4W 820K |
| R203 | ERDS2TJ331T | 1/4W 330 |
| R204 | ERDS2TJ824T | 1/4W 820K |
| R205 | ERDS2TJ331T | 1/4W 330 |
| R206 | ERDS2TJ561T | 1/4W 560 |
| R207 | ERDS2TJ822T | 1/4W 8.2K |
| R208 | ERDS2TJ102T | 1/4W 1K |
| R209 | ERDS2TJ471T | 1/4W 470 |
| R210 | ERDS2TJ332T | 1/4W 3.3K |
| R211 | ERDS2TJ222T | 1/4W 2.2K |
| R214 | ERDS2TJ103T | 1/4W 10K |
| R217 | ERDS2TJ471T | 1/4W 470 |
| R220 | ERDS2TJ103T | 1/4W 10K |
| R221 | ERDS2TJ104T | 1/4W 100K |
| R222 | ERDS2TJ473T | 1/4W 47K |
| R224 | ERDS2TJ824T | 1/4W 820K |
| R228, 229 | ERDS2TJ102T | 1/4W 1K |
| R230 | ERDS2TJ104T | 1/4W 100K |
| R231 | ERDS2TJ102T | 1/4W 1K |
| R232 | ERDS2TJ122T | 1/4W 1.2K |
| R233 | ERDS2TJ684T | 1/4W 680K |
| R234 | ERDS2TJ103T | 1/4W 10K |
| R240 | ERDS2TJ152T | 1/4W 1.5K |
| R247 | ERDS2TJ103T | 1/4W 10K |
| R301 | ERDS2TJ333T | 1/4W 33K |
| R302 | ERDS2TJ151T | 1/4W 150 |
| R303, 304 | ERDS2TJ223T | 1/4W 22K |
| R305, 306 | ERDS2TJ272T | 1/4W 2.7K |
| R307, 308 | ERDS2TJ562T | 1/4W 5.6K |
| R309 | ERDS2TJ154T | 1/4W 150K |
| R311 | ERDS2TJ102T | 1/4W 1K |
| R312 | ERDS2TJ153T | 1/4W 15K |
| R313, 314 | ERDS2TJ473T | 1/4W 47K |
| R315 | ERDS2TJ103T | 1/4W 10K |
| R316 | ERDS2TJ102T | 1/4W 1K |
| R317 | ERDS2TJ473T | 1/4W 47K |
| R319 | ERDS2TJ103T | 1/4W 10K |
| R320 | ERDS2TJ273T | 1/4W 27K |
| R321, 322 | ERDS2TJ153T | 1/4W 15K |
| R325, 326 | ERDS2TJ102T | 1/4W 1K |
| R327 | ERDS2TJ183T | 1/4W 18K |
| R702 | ERDS2TJ102T | 1/4W 1K |
| R703 | ERDS2TJ331T | 1/4W 330 |
| R704 | ERDS2TJ222T | 1/4W 2.2K |
| R705 | ERDS2TJ221T | 1/4W 220 |
| R710 | ERDS2TJ562T | 1/4W 5.6K |
| R711 | ERDS2TJ100T | 1/4W 10 |
| R715 | ERDS2TJ101T | 1/4W 100 |
| R716 | ERDS2TJ821T | 1/4W 820 |
| R911 | ERDS2TJ823T | 1/4W 82K |
| R912 | ERDS2TJ183T | 1/4W 18K |
| R913 | ERDS2TJ224T | 1/4W 220K |
| R914 | ERDS2TJ333T | 1/4W 33K |
| R915, 916 | ERDS2TJ101T | 1/4W 100 |
| R919 | ERDS2TJ103T | 1/4W 10K |
| R920 | ERDS2TJ102T | 1/4W 1K |
| R921 | ERDS2TJ103T | 1/4W 10K |
| R927 | ERDS2TJ224T | 1/4W 220K |
| R929 | ERDS2TJ152T | 1/4W 1.5K |
| R937 | ERDS2TJ392T | 1/4W 3.9K |
| R938 | ERDS2TJ562T | 1/4W 5.6K |
| R939 | ERDS2TJ123T | 1/4W 12K |
| R940 | ERDS2TJ182T | 1/4W 1.8K |
| R941 | ERDS2TJ222T | 1/4W 2.2K |
| R942 | ERDS2TJ273T | 1/4W 27K |
| R954, 955 | ERDS2TJ102T | 1/4W 1K |
| R957-959 | ERDS2TJ222T | 1/4W 2.2K |
| R960, 961 | ERDS2TJ104T | 1/4W 100K |
| R962 | ERDS2TJ682T | 1/4W 6.8K |
| R963 | ERDS2TJ274T | 1/4W 270K |
| R967, 968 | ERDS2TJ104T | 1/4W 100K |
| R970 | ERDS2TJ562T | 1/4W 5.6K |
| R971 | ERDS2TJ223T | 1/4W 22K |
| R972 | ERDS2TJ683T | 1/4W 68K |
| R973 | ERDS2TJ223T | 1/4W 22K |
| R975 | ERDS2TJ473T | 1/4W 47K |
| R976 | ERDS2TJ103T | 1/4W 10K |
| R978 | ERDS2TJ102T | 1/4W 1K |
| R980, 981 | ERDS2TJ2R2T | 1/4W 2.2 |
| R982 | ERDS2TJ223T | 1/4W 22K |
| R984 | ERDS2TJ471T | 1/4W 470 |
| R985, 986 | ERDS2TJ223T | 1/4W 22K |
| | | |
| | | CAPACITORS |
| | | |
| C101, 102 | ECBT1H150JC5 | 50V 15P |
| C103 | ECBT1H102KB5 | 50V 1000P |
| C105 | ECEA0JU101B | 6.3V 100U |
| C106, 107 | ECBT1C103NS5 | 16V 0.01U |
| C108 | ECEA25M4R7RB | 25V 4.7U |
| C109 | ECEA1CU330B | 16V 33U |
| C121 | ECBT1H102KB5 | 50V 1000P |
| C201, 202 | ECBT1C103NS5 | 16V 0.01U |
| C203 | ECBT1H8R2KC5 | 50V 8.2P |
| C204 | ECBT1H102KB5 | 50V 1000P |
| C205 | ECKR1H223ZF5 | 50V 0.022U |
| C206 | ECBT1H150JC5 | 50V 15P |
| C208 | ECEA0JU101B | 6.3V 100U |
| C209 | ECEA1EK4R7B | 25V 4.7U |
| C210 | ECFR1E103KR | 25V 0.01U |
| C211 | ECKR1H103ZF5 | 50V 0.01U |
| C212 | ECBT1E223ZF5 | 25V 0.022U |
| C213 | ECBT1H101KB5 | 50V 100P |
| C214 | ECEA1CK100B | 16V 10U |
| C215 | ECBT1C103NS5 | 16V 0.01U |
| C217 | ECEA1HK010B | 50V 1U |
| C218 | ECEA1HKR47B | 50V 0.47U |
| C220 | ECEA1CK100B | 16V 10U |
| C221 | ECBT1H102KB5 | 50V 1000P |
| C222 | ECFR1E473KR | 25V 0.047U |
| C225 | ECBT1H180JC5 | 50V 18P |
| C226 | ECBT1C103NS5 | 16V 0.01U |
| C227 | ECEA1CK100B | 16V 10U |
| C230 | ECBT1C103NS5 | 16V 0.01U |
| C236 | ECBT1H102KB5 | 50V 1000P |
| C301 | ECEA1CU101B | 16V 100U |
| C302 | ECEA1HKR47B | 50V 0.47U |
| C303 | ECEA1HK010B | 50V 1U |
| C304-306 | ECEA1VK3R3B | 35V 3.3U |
| C307, 308 | ECFR1E392KR | 25V 3900P |
| C309 | ECKR1H103ZF5 | 50V 0.01U |
| C310 | ECFR1E473KR | 25V 0.047U |
| C311 | ECQP1471JZ3 | 50V 470P |
| C313, 314 | ECBT1H102KB5 | 50V 1000P |
| C321 | ECEA1CK100B | 16V 10U |
| C323, 324 | ECFR1E332KR | 25V 3300P |
| C325 | ECBT1H330JC5 | 50V 33P |
| C330 | ECBT1H471JC5 | 50V 470P |
| C701 | ECEA1CU222YB | 16V 2200U |
| C702 | ECEA1CU102B | 16V 1000U |
| C704 | ECKR1H103ZF5 | 50V 0.01U |
| C705 | ECEA1CU221B | 16V 220U |
| C706 | ECEA1CK100B | 16V 10U |
| C707, 708 | ECKR1H103ZF5 | 50V 0.01U |
| C710 | ECKR2H102ZF5 | 500V 1000P |
| C711 | ECKR1H103ZF5 | 50V 0.01U |
| C716 | ECEA1VU330B | 35V 33U |
| C717 | ECKR2H102ZF5 | 500V 1000P |
| C718 | ECKR1H103ZF5 | 50V 0.01U |
| C719 | ECEA1EU101B | 25V 100U |
| C720 | ECKR1H103ZF5 | 50V 0.01U |
| C725 | ECKR1H103ZF5 | 50V 0.01U |
| C731 | ECEA1HU330B | 50V 33U |
| C732 | ECKR1H103ZF5 | 50V 0.01U |
| C740 | ECKWKC103PF2 | 400V 0.01U ⚠ |
| C901 | ECBT1H104ZF5 | 50V 0.1U |
| C902, 903 | ECEA0JU102B | 6.3V 1000U |
| C904 | ECEA1CU470B | 16V 47U |
| C905 | ECBT1C103NS5 | 16V 0.01U |
| C908, 909 | ECEA1VU330B | 35V 33U |
| C919 | ECBT1H220J5 | 50V 22P |
| C920 | ECBT1H180J5 | 50V 18P |
| C921 | ECEA1EK4R7B | 25V 4.7U |
| C923 | ECBT1H8R2KC5 | 50V 8.2P |
| C925 | ECBT1H102KB5 | 50V 1000P |
| C927 | ECBT1H102KB5 | 50V 1000P |
| C930 | ECBT1H181KB5 | 50V 180P |
| C931 | ECBT1H102KB5 | 50V 1000P |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| | | | |
| | | CABINET PARTS | |
| | | | |
| 1 | RHD30007 | SCREW | |
| 2 | RKMD055-1K | CABINET | |
| 4 | RMN0076 | FL HOLDER | |
| 5 | RGR0086A-F | REAR PANEL | (EG) |
| 5 | RGR0086A-D | REAR PANEL | (EI) F |
| 6 | RJS1A4902-A | AC CUTLET COVER | ⚠ |
| 8 | RFKJTX901LEK | BOTTOM BOARD ASS'Y | |
| 8-1 | RKA0011 | FOOT | |
| 9 | RGKD253 | ORNAMENT | |
| 10 | RGU0381 | MODE BUTTON | |
| 11 | RGU0382 | TIMER BUTTON | |
| 12 | RGW0077 | TUNING KNOB | |
| 13 | SBC986-2 | POWER BUTTON | |
| 14 | SBC987-3A | FUNCTION BUTTON | |
| 15 | SHE187-2 | HOLDER | |
| 16 | SNE4021 | NUT | |
| 19 | XTBS26+8J | SCREW | |
| 20 | XTBS3+8JFZ1 | SCREW | |
| 21 | XTB3+20JFZ | SCREW | |
| 22 | RFKGTX301EGK | FRONT PANEL ASS'Y | |
| | | | |
| | | PACKING MATERIAL | |
| | | | |
| P1 | RPG0457 | PACKING CASE | (EG) |
| P1 | RPG0681 | PACKING CASE | (EI) F |
| P2 | RPN0329 | PAD | F |
| P3 | SPSD152 | ACCESSORIES BOX | |
| P4 | XZB52X60A01Z | PROTECTION COVER | |

| Ref. No. | Part No. | Part Name & Description | Remarks |
|---|---|---|---|
| | | | |
| | | | |
| | | ACCESSORIES | |
| | | | |
| A1 | RAK-SC301X | REMOTE CONTROLLER | |
| A1-1 | RKKD008 | BATTERY COVER, REMOTE CONT. | |
| A2 | RQA0013 | WARRANTY CARD | |
| A3 | RQCB0169 | SERVICE CENTER LIST | |
| A4 | RQT0495-D | INSTRUCTIONS MANUAL | (EG) |
| A4 | RQT0496-V | INSTRUCTIONS MANUAL | (EI) F |
| A5 | RQCS0009 | CAUTION NOTE FOR FTZ | (EG) |
| A6 | SFDAC05E03 | POWER CORD | ⚠ |
| A7 | SJPK2203-2 | STEREO PIN CORD | |
| A8 | SPB1162T | AM LOOP ANTENNA | |
| A8-1 | SMA233-1M | HOLDER | |
| A8-2 | SMA231M | HOLDER | |
| A8-3 | XTB3+10AFZ | SCREW | |
| A9 | SSA270M | FM ANTENNA | |
| A10 | SWKTX930E | LEAD WIRE | |

## ■ EXPLODED VIEW








Printed in Japan
F900502600TW/YY

# MW/FM STEREO TUNER

ORDER NO. AD9004091C2-A

## DEUTSCH

**Tuner**

# ST-X301

## ■ MESSUNGEN UND JUSTIERUNGEN

### UKW JUSTIERUNGEN

**Einstellungen der Bedienelemente und zu verwendende Geräte.**

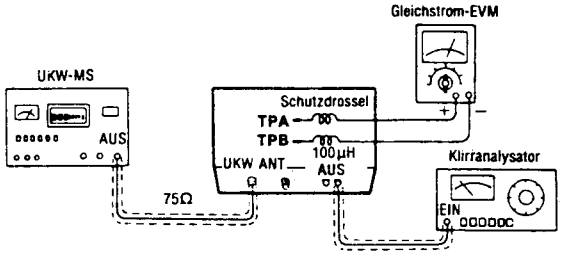
- UKW-Messender(UKW-MS)
- Stereo-Modulator
- Verzerrungs-Analystator
- Elektronische Gleichstrom-Voltmeter(EVM)
- Frequenzzähler
- Drosselspule(100μH)
- Widerstand(100kΩ)

**Anmerkung:** Für Z202 und Z251 werden bereits justierte Ersatzteile geliefert. Die Kerne dieser Teile daher nicht drehen.

### UKW-MONO-VERZERRUNGS-JUSTIERUNG

1.Der Testaufbau ist in der Abbildung gezeigt.
2.Stellen Sie die Einheit auf **"FM(UKW)"** Betrieb.
3.Die Radiofrequenzanzeige und den Messender auf **100.10MHz** einstellen.
4.Den Kern von **T201** so justieren, daß die im Signalzustand gemessene Spannung **0mV (0±20mV)** im 300mV-Bereich beträgt.
5.**T202** so justieren, daß der Verzerrungsfaktor des linken Kanals minimal wird.
6.Schritte 4 und 5 einige Male wiederholen.

ZUSTAND DES UKW-MESSENDERS
Modulation .....100%
Modulationsfrequenz .....1kHz
Ausgangspegel .....66dB




**TPA = TP201 , TPB = TP202**

**Anmerkung:**
Für die Justierung ist ein Schraubendreher aus Kunststoff zu verwenden.

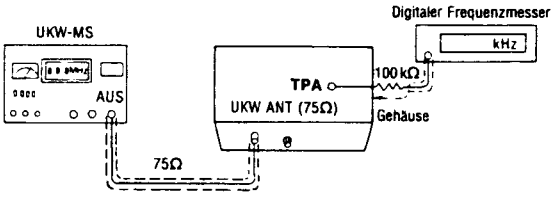
### MPX-SGO-JUSTIERUNG

1.Der Testaufbau ist in der Abbildung gezeigt.
2.Den UKW-Bertriebsart-Wahlshalter in die **"on/auto"**-Position stellen.
3.Radio und Meßsender auf **100.10MHz** einstellen.
4.**VR301** auf **19kHz ± 30Hz** auf der Frequenzzähleranzeige justieren.

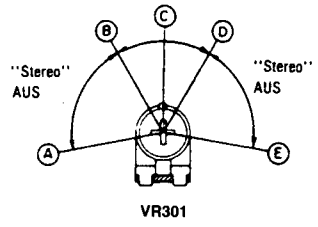
### ● VERWENDUNG EINES ALTERNATIVSYSTEMS

1.Stereosignal vom Meßsender eingeben oder eine Stereo-Sendung empfangen.
2.**VR301** justieren, bis die Stereo-Anzeige aufleuchtet. Den Arm von **VR301** mit Lack sichern, wie in der Abbildung gezeigt.

ZUSTAND DES UKW-MESSENDERS
Modulation .....100%
Modulationsfrequenz .....0kHz
Ausgangspegel,.....66dB




**TPA = TP301**

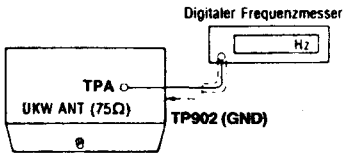



VR301

Ⓐ−Ⓑ,
Ⓓ−Ⓔ..... "Stereo" AUS Stellung
Ⓑ−Ⓓ..... "Stereo" EIN Stellung (Anzeigebeleuchtung)
Ⓒ..... Einstellpunkt des pilotschaltkreis'

## ELNSTELLUNG DER PHASENSPERRUNG EINES SCHLEIFENVERSCHIUSSES

1.Der Testaufbau ist in der Abbildung gezeigt.
2.Die Netzschalter auf OFF stellen. (Die Anzeige "**E**" blinkt.)
3.**CT901** auf **2,097,152Hz±10Hz** auf der Frequenzzähleranzeige justieren.




**TPA = TP901**

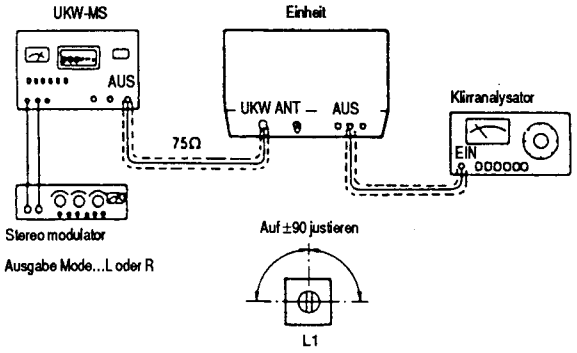
## UKW-STEREO-VERZERRUNGS-JUSTIERUNG

1. Der Testaufbau ist in der Abbildung gezeigt.
2. Stellen Sie die Einheit auf "**FM (UKW)**" Betrieb.
3. Die Radiofrequenzanzeige und den Messender auf **100.10 MHz** einstellen.
4. **L1** so justieren, daß der Verzerrungsfaktor des linken Kanals minimal wird.
5. Versichern Sie sich, daß die Verzerrungsfaktoren von Kanal L und Kanal R annahernd gleich sind und auf ein Minimum gehalten sind.

**Anmerkung:**
1. Für die Justierung ist ein Schraubendreher aus Kunststoff zu verwenden.
2. **L1** sollte nicht mehr als 1/4 Drehung (90 Grad) nach einer Seite gedreht werden.

ZUSTAND DES UKW-MESSENDERS

| | |
|---|---|
| Modulation | Stereo "L" Mode oder "R" Mode 45%, Pilot 10% |
| Modulationsfrequenz | 1 kHz (Pilot 19 kHz) |
| Ausgangspegel | 66 dB |



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